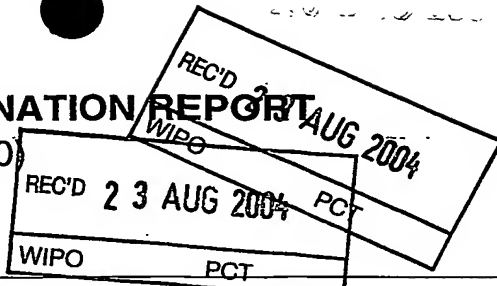


PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)





Applicant's or agent's file reference W 5039-1013 LB	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/PEA/416)	
International application No. PCT/EP 03/06109	International filing date (day/month/year) 11.06.2003	Priority date (day/month/year) 13.06.2002
International Patent Classification (IPC) or both national classification and IPC H01Q1/48		
Applicant SONY ERICSSON MOBILE COMMUNICATIONS AB et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 5 sheets, including this cover sheet.

☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

 These annexes consist of a total of 3 sheets.

3. This report contains indications relating to the following items:
 - I ☒ Basis of the opinion
 - II ☐ Priority
 - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
 - IV ☐ Lack of unity of invention
 - V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
 - VI ☐ Certain documents cited
 - VII ☐ Certain defects in the international application
 - VIII ☐ Certain observations on the international application

Date of submission of the demand 09.01.2004	Date of completion of this report 20.08.2004
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized Officer Cordeiro, J-P Telephone No. +49 89 2399-8252 

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/EP 03/06109

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, Pages

1-12 as originally filed

Claims, Numbers

1-13 as originally filed

Drawings, Sheets

1/4-4/4 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
☐ the language of publication of the international application (under Rule 48.3(b)).
☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
☐ filed together with the international application in computer readable form.
☐ furnished subsequently to this Authority in written form.
☐ furnished subsequently to this Authority in computer readable form.
☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
☐ the claims, Nos.:
☐ the drawings, sheets:

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. **PCT/EP 03/06109**

5. ☒ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

see separate sheet

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-13
	No: Claims	
Inventive step (IS)	Yes: Claims	
	No: Claims	1-13
Industrial applicability (IA)	Yes: Claims	1-13
	No: Claims	

2. Citations and explanations

see separate sheet

Re Item I

In order to facilitate easy reference the documents cited in the International Search Report are numbered seriatim (i.e. D1 to D3). This numbering will be used in the rest of the procedure.

The amendments filed with the letter dated 15.06.2004 introduce subject-matter which extends beyond the content of the application as filed, contrary to Article 19(2) & 34 (2) b) PCT:

- In **claim 1**, the added feature *"the antenna loop being positioned opposite said ground plane"* is not originally filed.
- In **claim 1**, the characterizing feature *"a ground plane extender positioned at a first side of the PCB"* replacing the originally filed *"a ground plane extender positioned in the extension of a first side of the PCB"* extends the subject-matter of said claim beyond the content of the application as filed.

Therefore, and considering **Rule 70.2 (c)** the present report is establish considering the originally filed claims 1 to 13.

Re Item V

1. Present independant claim 1, insofar as it is understandable, does not satisfy the requirements of Article 33(3) PCT because its subject-matter does not involve an inventive step:

Document D1: US 5,020,136 (see, e.g.: Abstract & figures 2-3a, 4 & column 3, lines 27-65 & column 5, lines 40-51) discloses all but one of the features described in claim 1: the sole feature representing a difference with D1 concerns the fact that D1 does not explicitly use a printed circuit board "PCB" but a planar conductive sheet as ground. However, the skilled man wanting to improve the weight and space of the portable transceiver of D1 would use as a common alternative in the art a PCB where he would integrate as many components as possible such as battery connections or antenna connections therefore achieving the result of claim 1 without any inventive step (Article 33(3) PCT).

It is to remark that D2: WO 01/76006 (see, e.g.: Abstract & figures 2-3, 6 & page 5, line 21 to page 6, line 19) and D3: US 6,266,019 B1 (see, e.g.: Abstract & figures 7a-b & column 8, lines 10-31, 40-47) use PCB for such improving purposes.

The subject-matter of independent claim 1 is consequently not inventive in respect to D1 and common knowledge, D1 and D2 or D1 and D3.

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/EP 03/06109

2. Considering claims 2 to 10, these do not contain any feature which could meet the requirements of Article 33(3) PCT in respect of inventive step, considering D1 (see, e.g.: Abstract & figures 2-3a & column 4, lines 3-18 & column 3, lines 27-65) and common knowledge, D1 and D2 or D1 and D3 according to the above reasoning of paragraph 1.
3. Claims 11 to 13 characterized by the antenna device of at least claim 1 do not contain any feature which, in combination with the features of the claims to which they refer, meet the requirements of Article 33(3) PCT in respect of inventive step, considering D1 and common knowledge, D1 and D2 or D1 and D3 according to the above reasoning of paragraph 1.

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CLAIMS

1. A loop antenna device (10, 20, 30) for a portable device (1), the antenna device (10, 20, 30) comprising an
5 antenna loop (11, 21, 31) of conducting material having first and second ends to be connected to radio frequency (RF) circuitry and a ground plane of a PCB (16, 26, 36), respectively, the antenna loop being positioned opposite said ground plane, characterized in that the loop antenna
10 device (10, 20, 30) further comprises a ground plane extender (17a, 17b, 27a, 27b, 37a, 37b) positioned at a first side of the PCB (16, 26, 36), and in a longitudinal extension of the ground plane.

15 2. The loop antenna device according to claim 1, wherein the ground plane extender is a battery casing.

3. The loop antenna device according to claim 1 or 2, wherein the antenna loop comprises first and second
20 connectors (15a, 15b, 25a, 25b, 35a, 35b) provided at a second side of the PCB (16, 26, 36) opposite said first side for connecting the antenna loop (11, 21, 31) to the RF circuitry and the ground plane of the PCB (16, 26, 36), respectively.

25 4. The loop antenna device according to any of the previous claims, wherein the antenna loop (11, 21, 31) further comprises:

a first portion (12) having a first and a second end,
30 said portion (12, 22, 32) extending in a first direction along a third side of the PCB (16, 26, 36), the first end being connected to the RF circuitry of the PCB (16, 26, 36);

a second portion (13, 23, 33) having a first and a
35 second end, the first end of the second portion (13, 23, 33) being connected to the second end of the first portion

(12, 22, 32), said second portion extending in a second direction from the third side of the PCB (16, 26, 36) towards a fourth side thereof, which is opposite said third side; and

5 a third portion (14, 24, 34) having a first and a second end, the first end of the third portion (14, 24, 34) being connected to the second end of the second portion (13, 23, 33) and the second end of the third portion (14, 24, 34) being connected to the ground plane of the PCB (16, 26, 36), said third portion (14, 24, 34) extending in the
10 opposite direction of said first direction along said fourth side of the PCB (16, 26, 36).

15 5. The loop antenna device according to any of the previous claims, wherein the PCB (16, 26, 36) is a multi-layer PCB having one layer used as a dedicated RF ground plane, which also provides the ground plane of the antenna device (10, 20, 30).

20 6. The loop antenna device according to any of the previous claims, wherein the antenna extender is at least one battery casing (17a, 17b, 27a, 27b, 37a, 37b) of a battery cell having a position to serve as an extension of the ground plane of the PCB (16, 26, 36).

25 7. The loop antenna device according to any of the previous claims, wherein the antenna loop (11, 21, 31) is positioned opposite a first or a second surface of the PCB (16, 26, 36).

30 8. The loop antenna device according to any of the previous claims, wherein the conductive material of the antenna loop (11, 21, 31) is metal.

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9. The loop antenna according to claim 7, wherein the antenna loop (11, 21, 31) is a U-shaped dielectric having the antenna shape etched into the dielectric.

5 10. The loop antenna device according to claim 5 or 6, wherein the antenna loop (11, 21, 31) is provided inside the PCB (16, 26, 36).

10 11. The loop antenna device according to any of the previous claims, wherein a bezel (28, 38), which is connected to the PCB, extends from the third side of the PCB (26, 36) towards the fourth side of the PCB, and/or bezel flanges (39a, 39b) connected to said ground plane extends along the third and fourth sides of the PCB.

15

12. A multi-layer printed circuit board (PCB), characterized by a loop antenna device according to any of the claims 1-11.

20 13. A portable communication device, characterized by a loop antenna according to any of the claims 1-11.

14. The portable communication device according to claim 13, wherein the apparatus is a headset (1).

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